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(54) Antenna choke.

(57) The antenna choke is used to reduce the choke of current which mutually couples adjacent array sections. In order to simplify manufacture, a single channel (6) is machined between each row of array sections (2,4), the channel effectively reduces the ground plane current between the various sections. The choke allows for a relatively easy manufacturing process in which the array is built by sequentially placing conductive type sealant between the adjacent sections and bolting or securing the sections in place. The array sections include a number of radiating elements (10) which may be of any form for example rectangular waveguides or dipole radiators.

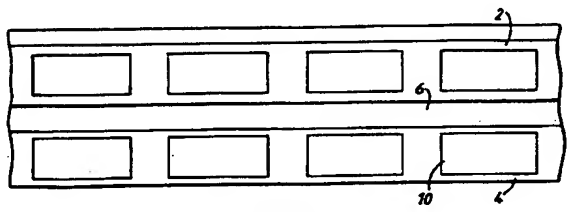

Fig.2.

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The present invention relates to an antenna choke suitable for use in the field of radar antenna arrays.

Radar antenna arrays are composed of a number of radiating elements which are connected to each other. A problem with such arrays is that an electric current mutually couples the adjacent radiating elements. It is therefore desirable to reduce this current so that the performance of the array is increased.

Antenna array chokes are known, and one such example is discussed in a book entitled "Theory and Analysis of Phased Array Antennas" by M Amitay, V Galindo and C P Wu, and published by Wiley Interscience. At page 308 of the above reference book, there is shown a planar array of compound elements. The array is shown in Figure 1 herein and includes a plurality of circular waveguides 1, and each circular waveguide has an associated rectangular waveguide 3 which together make up a unit cell. The effect of the rectangular waveguide is to break up the path of the ground plane currents which travel between the circular waveguides, and therefore these rectangular waveguides act mainly as chokes. While the small rectangular waveguides have been found to be effective in choking the ground plane currents, their manufacture has proved to be quite difficult.

It is an object of this present invention to provide an antenna choke which is easily manufactured and which reduces the current which mutually couples adjacent sections of a radar array.

According to the present invention there is provided an antenna choke for an antenna array, the array comprising a plurality of linear array sections containing a plurality of individual radiating elements, each array section having a channel of predetermined depth formed throughout its length in an edge thereof, so that when the array sections are stacked with the channels facing the same direction to form the array, the channels between adjacent array sections act as a choke to reduce an electric current which mutually couples adjacent array sections.

The present invention has the advantage of simplicity of construction and therefore is more easily manufactured.

An embodiment of the present invention will now be described with reference to the accompanying drawings, wherein;

FIGURE 1 shows a prior art antenna array;

FIGURE 2 shows a partial front view of an antenna array according to the present invention; and,

FIGURE 3 shows a partial side view of an antenna array according to the present invention.

FIGURE 4 shows a partial side view of an antenna array incorporating a different type of radiating element; and

FIGURE 5 shows a partial plan view of the array shown in Figure 4.

Referring to Figures 2 and 3, the antenna array comprises a plurality of linear array sections 2, 4. Each section is of rectangular cross section and has a plurality of rectangular radiating elements 10 positioned along its length. Each section has a rectangular channel 6 cut into an edge of each element which extends along the entire length of the section. The channel 6 is machined into each section prior to assembly of the antenna array and therefore the manufacture of such arrays is made very much easier than the array discussed in the prior art.

The channel 6 has a depth equal to a quarter of the wavelength of the operating frequency of the array. This mount of depth effectively chokes or reduces the ground plane currents which exists between the adjacent sections of the array.

Since the array is made up of a number of linear array sections, such as 2, 4, the array is built by sequentially placing one section on top of another section and placing a conductive type sealant 8 between each section. The sections are secured together by suitable bolts, for example, with the channels all facing in the same direction to give an assembled array.

The array therefore inherently has the necessary chokes incorporated in it by virtue of the channels.

Figures 4 and 5, show an antenna array in which the radiating elements are of different shape to those shown in Figures 2 and 3. The array is composed of a number of linear array sections 2, 4 similar to those shown in Figures 2 and 3, connected together with sealant 8 between adjacent sections. Each section has a channel 6 cut into it along its length at a depth equal to a quarter of the wavelength of the operating frequency of the array. The radiating elements 10, each comprise a pair of dipoles 12 printed on a substrate 14. The radiating elements 10 extend from the array sections 2, 4 in the same direction as shown in Figures 4 and 5.

It will readily be appreciated by those skilled in the art that radiating elements of different shape to those described above may be used.

It will be readily appreciated by those skilled in the art, that while the above description has been to an antenna array being composed of array sections which have rectangular cross sections, cross sections of a different shape may be used. The array sections may be curved throughout their length so that an antenna array of a dish form is produced.

It will also be readily appreciated by those skilled in the art that any radiating elements combined in the form of a linear array may be used

providing that the body of rectangular cross section can be formed. It will also be readily appreciated by those skilled in the art that any lattice, rectangular, triangular or random may be used provided it can be formed from linear arrays in either horizontal or vertical form.

Claims

1. An antenna choke for an antenna array, the array comprising a plurality of linear array sections containing a plurality of individual radiating elements, each array section having a channel of predetermined depth formed throughout its length in an edge thereof, so that when the array sections are stacked with the channels facing the same direction to form the array, the channel between adjacent array sections act as a choke to reduce an electric current which mutually couples adjacent array sections.

2. An antenna choke as claimed in Claim 1, wherein the array sections are of rectangular cross section, and the channel is cut into an edge of the array section and is substantially right angular in form.

3. An antenna choke as claimed in Claim 1 or Claim 2, wherein the array sections are stacked with an electrically conductive sealant therebetween.

4. An antenna choke as claimed in any preceding claim, wherein the depth of the channel is a quarter of the operating wavelength of the antenna array.

5. An antenna choke as claimed in any preceding claim, in which the radiating elements are of rectangular cross section.

6. An antenna choke as claimed in any of the claims 1 to 4, in which the radiating elements are dipoles.

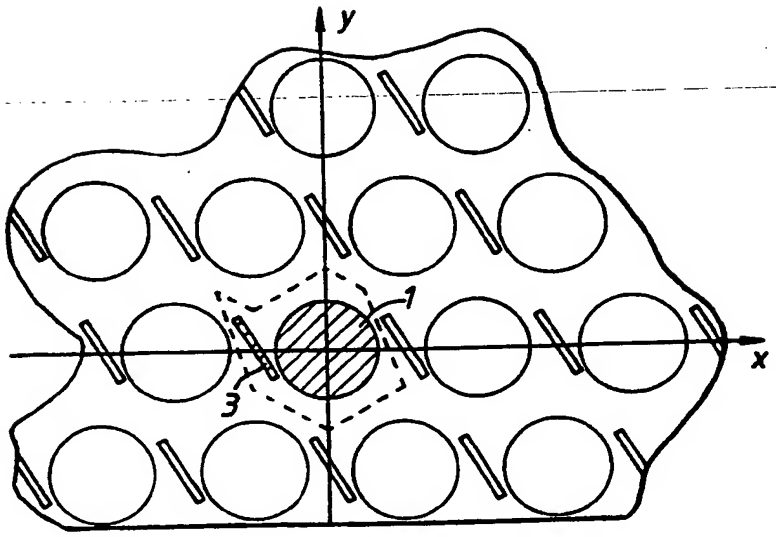

Fig.1.

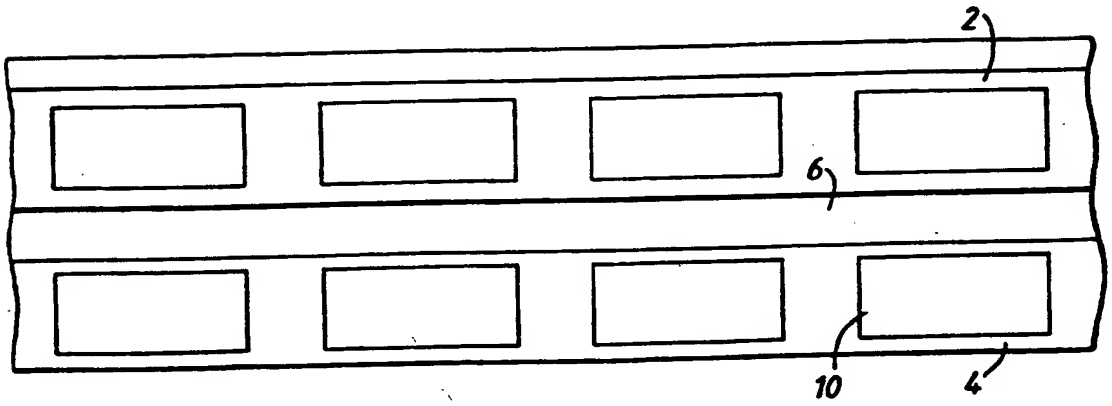

Fig.2.

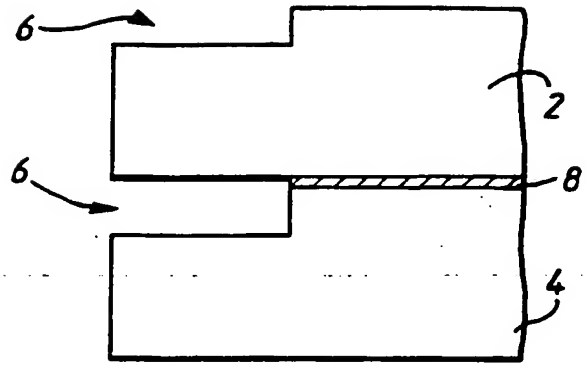

Fig.3.

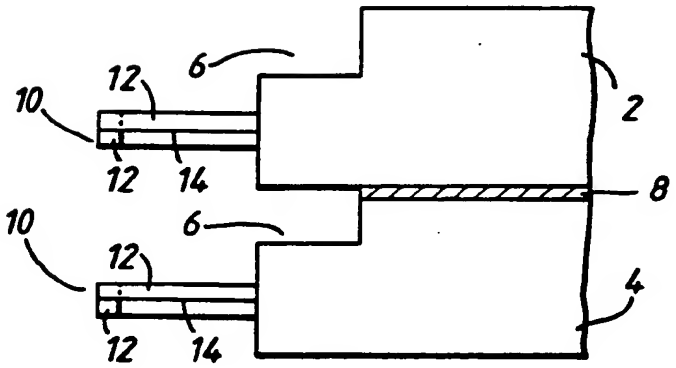

Fig.4.

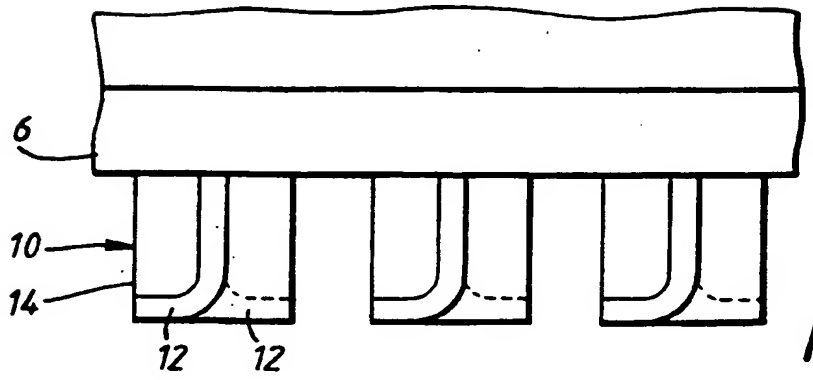

Fig.5.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 92 30 8825

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-2 557 951 (DE ROSA ET AL.) * column 2, line 15 - line 33; figures 1-11 *	1,5	H01Q1/52 H01Q21/00
A	GB-A-2 225 170 (GEC-MARCONI) * page 4, paragraph 4 - page 5, paragraph 1; figure 1 *	1,6	
A	EP-A-0 227 121 (NEC) * abstract; figures 13-16 *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 005, no. 044 (E-050)24 March 1981 & JP-A-56 000 716 (TOKYO KEIKI) * abstract *	1	
A	EP-A-0 186 455 (MARCONI) * abstract; figures 2,5 *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

H01Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 JUNE 1993	ANGRABEIT F.F.K.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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& : member of the same patent family, corresponding document

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